

IN THE CLAIMS:

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1. (Once Amended) A method for producing a semiconductor device including formation of an interlayer insulating film having a fluorine-doped silicon oxide layer on above a substrate, the method comprising the steps of:

forming said fluorine-doped silicon oxide layer in a process chamber; and
forming a silicon oxide layer on said fluorine-doped silicon oxide layer in ~~the~~ a same process chamber subsequent to the formation of said fluorine-doped silicon oxide layer, said silicon oxide layer being formed at a temperature at least 10% higher than a film forming temperature of said fluorine-doped silicon oxide layer; thereby

forming said interlayer insulating film comprising said fluorine-doped silicon oxide layer and said silicon oxide layer formed thereon ~~on said substrate~~.

2. (Not Modified) The method for producing a semiconductor device according to claim 1, wherein

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a film forming temperature of said silicon oxide layer is equal or less than 450 °C.

3. (Not Modified) The method for producing a semiconductor device according to claim 1, further comprising the steps of:

forming an insulation layer on said silicon oxide layer; and
planarizing said insulation layer with a chemical mechanical polishing process or a plasma etching process from a surface side of said insulation layer without exposing said fluorine-doped silicon oxide layer.

4. (Not Modified) A method for producing a semiconductor device including formation of an interlayer insulating film having a fluorine-doped silicon oxide layer on a substrate, the method comprising the steps of:

forming said fluorine-doped silicon oxide layer in a process chamber; and
removing a surface layer of said fluorine-doped silicon oxide layer by sputtering in the same process chamber subsequent to the formation of said fluorine-doped silicon oxide layer.

5. (Not Modified) The method for producing a semiconductor device according to claim 4, further comprising the steps of:

forming an insulation layer on a surface layer of said fluorine-doped silicon oxide layer after the sputtering; and
planarizing said insulation layer with a chemical mechanical polishing process or a plasma etching process from a surface side of said insulation layer without exposing said fluorine-doped silicon oxide layer.